Paper No. 20

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WILHELM KARNER and
DIETFRIED GAMSRIEGLER

Appeal No. 1997-0664
Application No. 08/280,945

ON BRIEF

Before JOHN D. SMITH, WARREN, and DELMENDO, Administrative Patent Judges.

DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's refusal to allow claims 1, 3 through 11, and 13 through 35, as amended subsequent to the final

rejection.[1] These are the only claims remaining in the application.

Claims 1, 14, and 25 are illustrative of the claims on appeal and are reproduced below:

> 1. In a process for the regeneration of hydrochloric acid used as a pickling acid in a pickling bath, wherein iron chloride is produced in said pickling bath and wherein said regeneration process includes the thermal decomposition of said iron chloride in the spent pickling acid from said pickling bath into iron oxide and gaseous hydrochloric acid and molecular chlorine, the improvement comprising admixing with the spent pickling acid from said pickling bath at least one compound which contains nitrogen having a low oxidation number whereby said at least one compound reacts with said molecular chlorine to regenerate said hydrochloric acid and produce molecular nitrogen.
>
> 14. In a process for the regeneration of hydrochloric acid used as a pickling acid in a pickling bath, wherein iron chloride is produced in said pickling bath and wherein said regeneration process includes the thermal decomposition of said iron chloride in the spent pickling acid from said pickling bath into iron oxide and gaseous hydrochloric acid and molecular chlorine and further including the formation of nitrogen oxides, the improvement comprising admixing with the spent

[1] See the amendments filed September 29, 1995 and December 29, 1995 (Paper No. 9 and Paper No. 12), which the examiner indicated in two separate advisory actions as being approved for entry upon the filing of an appeal (Paper No. 10 and Paper No. 13).

pickling acid from said pickling bath at least one compound which contains nitrogen which will react with said molecular chlorine and said nitrogen oxides to regenerate said hydrochloric acid and produce molecular nitrogen.

25. In a process for the regeneration of hydrochloric acid used as a pickling acid in a pickling bath, wherein iron chloride is produced in said pickling bath and wherein said regeneration process includes the thermal decomposition of said iron chloride in the spent pickling acid from said pickling bath into iron oxide and gaseous hydrochloric acid and molecular chlorine and further including the formation of nitrogen oxides, the improvement comprising admixing with the spent pickling acid from said pickling bath at least one compound which contains nitrogen having a low oxidation number and selected from the group consisting of ammonium compounds, ammonia, urea, and amides.

The subject matter on appeal generally relates to a process for regenerating hydrochloric acid from pickling plants, in which iron chloride in the spent pickling acid is thermally decomposed into iron oxide and gaseous hydrochloric acid (brief, page 3). According to the appellants, the process of pickling steel products with hydrochloric acid (or mixtures containing hydrochloric acid) dissolves mill scale layers that are formed on the steel surface by preceding processes such as rolling or annealing, according to the following reaction:

$FeO + 2HCl \rightarrow FeCl_2 + H_2O$ (brief, pages 3-4).

The appellants further explain that the consumed or spent pickling acid and the iron chloride contained therein can be decomposed by a thermal decomposition process (usually spray roasting or the fluidized bed process) according to the following reaction:

$2FeCl_2 + 2H_2O + 0.5O_2 \rightarrow Fe_2O_3 + 4HCl$ (brief, page 4).

However, the appellants also state that undesirable pollutants, namely oxides of nitrogen (NO_x) and chlorine, may be formed during the thermal decomposition process (*id*.). Thus, the present invention is directed to a process which avoids the formation of pollutants, such as chlorine and NO_x, during the thermal decomposition by mixing the spent pickling acid with at least one compound containing nitrogen having a low oxidation number, for example ammonium compounds such as ammonium chloride, ammonia, ureas, or amides (*id*.).

The prior art references relied upon by the examiner as evidence of obviousness are:

Michels et al. (Michels)	3,399,964	Sep. 03, 1968
Jackson et al. (Jackson)	3,755,090	Aug. 28, 1973

Holley et al. (Holley)	4,086,321	Apr. 25, 1978
Burton	4,842,834	Jun. 27, 1989
Fellows et al. (Fellows)	5,098,680	Mar. 24, 1992

The grounds of rejection presented for our review in this appeal are as follows:

Claims 1, 3, 4, 9 through 11, 13 through 16, 21 through 27, and 32 through 35 stand rejected under 35 U.S.C. § 103 as unpatentable over Holley in view of Burton and Jackson.[2]

Claims 5, 6, 17, 18, 28, and 29 stand rejected under 35 U.S.C. § 103 as unpatentable over Holley in view of Burton and Jackson, and further in view of Michels.

Claims 7, 8, 19, 20, 30, and 31 stand rejected under 35 U.S.C. § 103 as unpatentable over Holley in view of Burton, Jackson, and Michels, and further in view of Fellows.

We have carefully reviewed the entire record, including the specification, the claims, and all of the arguments advanced by the examiner and the appellants, for which we refer to the examiner's answer and the appeal brief, respectively. Notwithstanding the examiner's exceptionally

[2] The statement of rejection on page 3 of the answer includes claims 2 and 12. However, these claims were canceled in the amendment filed March 31, 1995 (Paper No. 6).

thorough treatment of all the issues, we find ourselves in agreement with the appellants that the subject matter of the appealed claims would not have been *prima facie* obvious to one of ordinary skill in the art within the meaning of 35 U.S.C. § 103 over the applied prior art references. Accordingly, we reverse.

The examiner correctly summarizes the teachings of Holley, the principal prior art reference, as follows:

> Holley et al disclose a method for producing pre metallic oxides by dissolving the metal or oxide in heated dilute hydrochloric acid to form metallic chloride in a water solution (which solution may instead, be a waste product from a steel strip pickling line) (note abstract). The solution is passed to a throat venturi scrubber. The venturi acts as a heat exchanger to extract heat from the hot off gas stream coming from the reaction zone (note column 3, lines 3-10). The gas leaves the venturi scrubber and goes to the adiabatic absorber. The concentrated solution is sprayed into the reaction zone by using the bi-fluid nozzles 23. The thermal decomposition of ferrous and ferric chloride is accomplished by atomizing the concentrated metallic solution into small droplets, in the presence of oxygen and water vapor. The heat required to vaporize the water and thermally decompose the metal chloride can be provided directly by introducing the products of combustion into the reaction chamber or roaster (i.e. spray roasting reactor as required in the instant claim 4) at a temperature of about 2500EF (1371EC). The combustion gas is generated by burning a gaseous oil or fuel (note column 3, lines 17-42). [Answer, pp. 3-4.]

The examiner also correctly determines that Holley's process differs from the process of the appealed claims in the

use of the recited "at least one compound which contains nitrogen" (appealed claims 1, 14, and 25) (answer, page 4).

To remedy this deficiency in Holley, the examiner relies upon the teachings of Burton and Jackson. According to the examiner, Burton teaches that NO_x pollutants are formed during the high temperature combustion of carbonaceous fuel, that such pollutants are undesirable, and that the pollutants can be reduced by spraying a solution of urea and water to the effluent of the combustion gas (answer, pages 4-5). The examiner also relies upon Jackson for the teaching that the pickling bath may contain nitric acid and, in addition, urea, which is described in the reference as inhibiting the accumulation of nitrous acid and NO_x (answer, page 5). Further, the examiner adds that "Jackson et al fairly suggest the feasibility of having a mixture of urea/acid solution and the urea is still capable of removing the NO_x compounds" (answer, page 6) but explains that "Jackson et al is only applied to teach that the presence of urea in a pickling bath would not have any negative effect on the pickling process and in [the] pickling art, the artisan recognizes that NO_x is [are] undesirable by-products" (answer, page 13).

Based on these prior art teachings, the examiner concludes that it would have been obvious to one of ordinary

skill in the art to add urea to Holley's spent pickling acid before it is sprayed into reaction chamber, as suggested by Burton, in order to remove undesirable NO_x compounds (answer, pages 5-6). The examiner further reasons that one of ordinary skill the art would have added urea to the spent pickling acid before it is sprayed into the reaction chamber in order to require the use of only one spray nozzle, thereby minimizing capital costs (answer, page 6). We disagree.

Under 35 U.S.C. § 103, the examiner carries the initial burden of establishing a *prima facie* case of obviousness. *In re Piasecki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984). As part of meeting this initial burden, the examiner must determine whether the differences between the subject matter of the claims and the prior art "are such that *the subject matter as a whole* would have been obvious at the time the invention was made to a person having ordinary skill in the art" (emphasis added). 35 U.S.C. § 103(a)(1999); *Graham v. John Deere Co.*, 383 U.S. 1, 14, 148 USPQ 459, 465 (1966).

When multiple prior art references are combined to support an obviousness rejection, there must be some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to combine the references.

In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453, 1456 (Fed. Cir. 1998)(citing *In re Geiger*, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987)). The suggestion or motivation may come from the prior art references themselves, from knowledge by those skilled in the art that certain references are of special interest in a field, or from the nature of the problem to be solved. *Rouffet*, 149 F.3d at 1355-56, 47 USPQ2d at 1456.

In the case before us, the examiner submits that one of ordinary skill would have found it obvious to add urea to Holley's spent pickling acid before it is sprayed into reaction chamber, as suggested by Burton, in order to remove undesirable NO_x compounds (answer, pages 5-6). As pointed out by the appellants (brief, page 9), however, Burton relates to a conventional combustion process, not to a process of regenerating hydrochloric acid in which the thermal decomposition of iron chloride is carried out. In fact, none of the relied upon prior art references identify the same problems with which the appellants are concerned (i.e., the problems of chlorine and NO_x formation in the types of processes contemplated by the appellants). *In re Sponnoble*, 405 F.2d 578, 585, 160 USPQ 237, 243 (CCPA 1969) ("[A] patentable invention may lie in the discovery of the source of

a problem even though the remedy may be obvious once the source of the problem is identified. This is part of the 'subject matter as a whole' which should always be considered in determining the obviousness of an invention under 35 U.S.C. 103.").

Moreover, it is our view that the prior art does not establish the requisite reasonable expectation of success in modifying Holley's process in the manner as suggested by the examiner. Specifically, we note that Burton uses urea in the context of a conventional combustion flue gas. By contrast, in Holley, the environments in the Venturi scrubber **17** and reaction chamber **18** contain chemicals not normally present in plain combustion flue gas, including highly acidic compounds such as hydrochloric acid. Although the examiner relies on Jackson for suggesting "the feasibility of having a mixture of urea/acid solution" (answer, page 6), we agree with the appellants (brief, page 10) that Jackson does not teach urea in combination with hydrochloric acid.[3] Nor does Jackson teach or suggest that urea would work in a gas-liquid type environment of the type described in Holley. Thus, nothing in

[3] Jackson teaches the use of urea in combination with nitric acid (column 4, lines 3-14). Further, Jackson describes the use of nitric acid as an alternative to using hydrochloric or sulfuric acid (column 5, lines 40-52).

the applied prior art references suggests that Burton's urea would function in Holley's environments as it would in a conventional combustion flue gas. In this regard, "[b]oth the suggestion and reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991)(citing *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988)).

For these reasons, we hold that the applied prior art references do not establish a *prima facie* case of obviousness against appealed independent claims 1, 14, and 25 within the meaning of 35 U.S.C. § 103. Since appealed claims 3 through 11, 13, 15 through 24, and 26 through 35 all directly or indirectly depend from one of these independent claims, it follows that the subject matter of these dependent claims would also not have been obvious over the applied prior art references. *In re Fine*, 837 F.2d 1071, 1076, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988).

The examiner's 35 U.S.C. § 103 rejections of (i) claims 1, 3, 4, 9 through 11, 13 through 16, 21 through 27, and 32 through 35 as unpatentable over Holley in view of Burton and Jackson, (ii) claims 5, 6, 17, 18, 28, and 29 as unpatentable over Holley in view of Burton, Jackson, and Michels, and (iii)

claims 7, 8, 19, 20, 30, and 31 as unpatentable over Holley in view of Burton, Jackson, Michels, and Fellows are reversed.

The decision of the examiner is reversed.

REVERSED

JOHN D. SMITH Administrative Patent Judge	)
CHARLES F. WARREN Administrative Patent Judge	) BOARD OF PATENT APPEALS AND INTERFERENCES
ROMULO H. DELMENDO Administrative Patent Judge	)

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